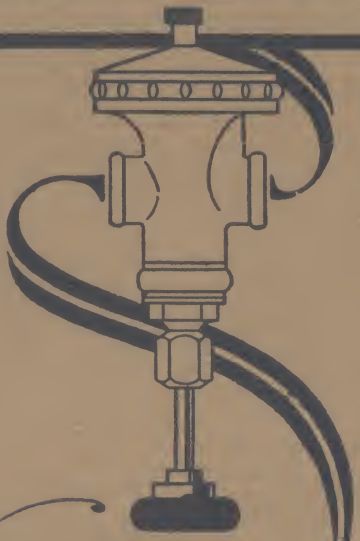
DUNHAM SPECIALTIES



C. A. DUNHAM CO.
MARSHALLTOWN, IOWA.

BULLETIN No. 5

Oct. 15, 1915

C. A. Dunham Company

MARSHALLTOWN, IOWA

NEW YORK CHICAGO SAN FRANCISCO

Branch Offices in All the Principal Cities

(This Bulletin supersedes all information covering same subject heretofore published by us.)

SUBJECT

The Dunham Radiator Trap and Its Application

OTHER BULLETINS WHICH MAY BE HAD ON APPLICATION ARE

BULLETIN No. 1—The Dunham Vacuo Vapor System of Heating—What it is—How it Operates.

BULLETIN No. 2—Advantages of Steam for Heating—Why the Dunham Vacuo Vapor System is Superior.

BULLETIN No. 3—How to Install the Dunham Vacuo Vapor System of Heating.

BULLETIN No. 4—How to Operate the Dunham Vacuo Vapor System of Heating.

BULLETIN No. 6—The Dunham Blast Trap and its Application.

BULLETIN No. 7—The Dunham Air Line Valve and its Application.

BULLETIN No. 8—Dunham Traps for High Pressure Service.

BULLETIN No. 9—The Dunham Reducing Pressure Valve and Vacuum Pump Governor.

BULLETIN No.10—Some Buildings where the Dunham Systems of Heating are now Installed.

BULLETIN No.11—The Dunham Vapor System.

BULLETIN No.12—The Dunham Packless Inlet Valve.

THE DUNHAM RADIATOR TRAP

If ever a Company was justified in being proud of an article of its manufacture, the C. A. Dunham Company is justified in being proud of the Dunham Radiator Trap. We dare say that no article was ever made that has more nearly lived up to the ideals of service it was designed to render than this trap. Getting its start against the most overwhelming obstacles of competition, it stands today, pre-eminent in the field, its reputation made, and its place in the realm of modern heating practice assured.

When the Dunham Radiator trap came upon the market in 1903* its principle was criticised by nearly every competitor in the field. These insistent competitors said that such a trap was not practical and would not work. Every possible obstacle was placed in the way of its advancement, but to no avail. One competitor even tried to thwart its progress by bringing action in the courts on the claim that its use was an infringement of one of their patents. Rightfully, this lustful competitor lost its suit. While such competition stunted, for the time being, the sales of the Dunham Company, yet the Dunham Trap, where installed, was rendering almost perfect service, and flaunting its superiority to everyone who used it or saw it work.

Then came the change of heart in competitors. They saw the sign in the heavens and they heeded. They saw that the Dunham Trap was better than their own and they began to re-design theirs to conform to the same lines. Today, almost every competitor is making his trap along the lines of the Dunham. And they criticise the Dunham principle no more.

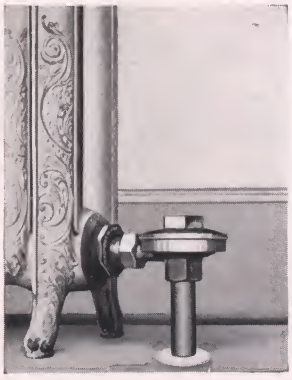
Would it be possible to have a higher compliment paid a line of goods than that paid the Dunham Radiator Trap by its competitors? Can the merit of the Dunham Radiator Trap be better shown in any other way? Condemned by competitors first, lauded by users next, and then copied by competitors finally: that is the remarkable record of the Dunham Radiator Trap, which we believe challenges a parallel in the commercial world.

The radiator trap is the heart of any steam heating plant. Upon its successful operation depends the successful operation of the whole heating plant. Without the trap there could be

* The Dunham high pressure trap was on the market for about four years previous to this.

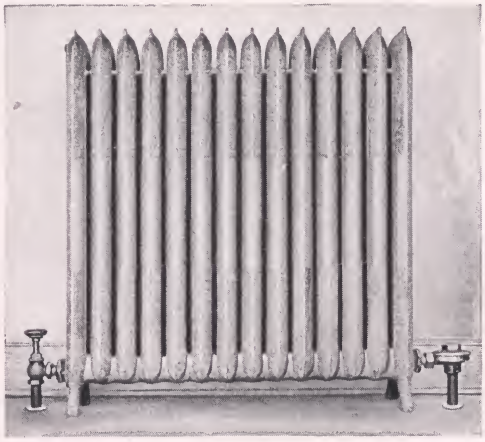
no successful vacuum heating systems. So important a part does it play that its name designates the name of the system. Without the Dunham Radiator Trap there would be no Dunham System.

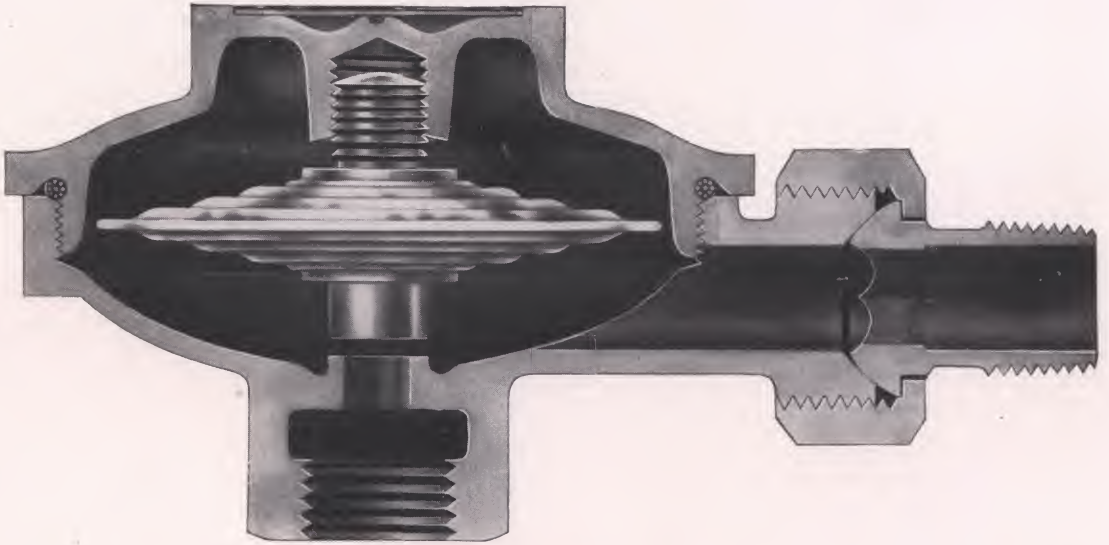
Uses: The Dunham Radiator Trap is used in connection with all classes of low pressure (below ten pounds) steam heating work. Its inlet connects (see cut herewith) to the return end of radiator or coils in a heating system and its discharge connects to the return line. *Its duty consists of automatically letting all water and air out of the radiator without letting any steam out. When used, it takes the place of noisy property destroying air valves on the radiator, renders the system noiseless, makes it possible for you to regulate the heat in your radiator at will by means of the supply valve, and economizes, to the last point, on fuel.*



It will work upon any kind of a two-pipe system, whether it be gravity, vapor or vacuum. It is being used with marvelous success in plants where the source of steam supply is from city or central station plants. Large lake and ocean going steamers are using it.

The trap is the acme of simplicity. It has but one movable part, (see cut next page). It has no sliding contacts to become rusty or clogged with dirt. Its construction permits of a flat valve being used thereby eliminating all obstructions in the valve area, etc. It has no loose parts to rattle and make annoying noises. All of its parts are constructed of non-corrosive materials. Even the shell is made of phosphor bronze, one of the best steam





SECTIONAL VIEW DUNHAM RADIATOR TRAP
FULL SIZE NO. 2 TRAP

metals known. Its disc, which is the one movable part, is constructed of a special material, which, besides being absolutely non-corrosive, is tough and resilient, and almost indestructible. It is a metal that has stood the test of years of service and has made the following remarkable record—the percentage of Dunham Discs that have failed and been reported to us during the time the C. A. Dunham Company has been in existence is about ⅜ of one per cent.

How It Operates: (Refer to sectional cut opposite page). The disc, or movable part of the trap, is anchored rigidly to the cover. It contains a combination of volatile fluids. These fluids are non-corrosive and being hermetically sealed within the disc, indefinitely retain the latent power of expanding and contracting in response to the effects of temperature.

On the lower portion of the disc is the flat valve (one of the greatest features of the Dunham Trap is that its disc will admit of the use of a flat valve) which hangs over the large opening of the trap that leads direct to the return line. When installed, the chamber containing the disc is connected directly to the radiator, hence the same conditions that exist in the radiator always exist around the disc. Air or water going through the radiator do not effect the disc and pass through the opening and into the return line unmolested. But when steam comes, the volatile liquids in the disc are heated and vaporized, thereby creating a pressure within the disc. This internal pressure expands the disc, the valve seats itself over the large opening and the trap closes. Subsequent water and air forming in the radiator naturally falls to the bottom, surrounds the disc, condenses the vapor within it, and the disc contracts and the trap opens. The vacuum, or suction, in the return line, sucks the water and air through the trap, steam follows and surrounds the disc again and the trap closes.

Service and Capacities The Dunham Radiator Trap, as stated previously, is for use on steam pressures up to ten pounds, and is made in three sizes; one size for radiators up to 100 square feet of direct radiation or its equivalent, designated as our No. 1 trap; one for radiators from 100 to 350 square feet of direct radiation or its equivalent, designated as our No. 2 trap, and one for 350 to 450 square feet of direct cast iron radiation or its equivalent, designated as our No. 3 trap. The first two sizes are both made with ½ inch

connections, while the last mentioned trap is made with ¾ inch connections.

All Dunham Radiator Traps are made of identically the same material and embody the same high quality of workmanship. They are all made in four patterns; namely, Angle, Right Hand, Left Hand and Straightway.

Complete roughing-in dimensions of all sizes and patterns of these traps will be found on Page 8 of this bulletin.

Important We have on file here special detail drawings showing just how to install the Dunham Trap in its many possible applications. Such drawings will be furnished you free, upon application. We will also furnish special drawings, at no cost to you.

Partial List of Users

OFFICE BUILDINGS

Woolworth Building, New York City
Continental Life Building, New York City
Union Central Life Building, Cincinnati
Insurance Exchange Building, Chicago
Otis Building, Chicago
North American Building, Chicago
Hearst Building, Chicago
Mason-Foster Building, Houston, Texas
Colcord Building, Oklahoma City
Northwestern Bank Building, Portland, Oregon
Stevens Building, Portland, Oregon
Wood-Lark Building, Portland, Oregon
Hobart Building, San Francisco, Cal.
Forum Building, Sacramento, Cal.
Paulson Building, Spokane, Wash.
Vermont Building, Salt Lake City, Utah
Buffalo Gas Co. Building, Buffalo, N. Y.
Kaufmann-Baer Building, Pittsburg
Mining Exchange Building, Colorado Springs
Hubbell Building, Des Moines, Iowa
Kresge Building, Detroit
Fayette National Bank Building, Lexington, Ky.

HOTELS

Morrison Hotel, Chicago
Sherman Hotel, Chicago
Fort Dearborn Hotel, Chicago
Blackhawk Hotel, Davenport, Ia.
Custer Hotel, Galesburg, Ill.
Magnus Hotel, Cedar Rapids, Ia.
Muscatine Hotel, Muscatine, Ia.
Muehlbach Hotel, Kansas City, Mo.
Capitol Hotel, Marshall, Texas
Clift Hotel, San Francisco, Cal.
Davenport Hotel, Spokane, Wash.
Rosslyn Hotel, Los Angeles, Cal.
Claridge Hotel, New York City
Vendig Hotel, Philadelphia, Pa.
Utica Hotel, Utica, N. Y.
Nonotuck Hotel, Holyoke, Mass.
Belleview Hotel, Belleair, Fla.
Bancroft Hotel, Worcester, Mass.
Hollendon Hotel, Cleveland, O.
Capitol Park Hotel, Washington, D. C.

GOVERNMENT BUILDINGS

U. S. Post Office, Washington, D. C.
U. S. Post Office, Minneapolis, Minn.
U. S. Barge Building, New York City
U. S. Indian School, Flandreau, S. Dak.
U. S. Military Prison, Ft. Leavenworth, Kans.
National Military Home, Ft. Leavenworth, Kans.

THE DUNHAM RADIATOR TRAP

FACTORIES

American Can Co., New York, (All factories in U. S. and Canada)
Willys-Overland Co., Toledo, Ohio
Loose-Wiles Biscuit Co., (All factories except Boston and Dallas)
Lyon & Healy Co., Chicago
Holeproof Hosiery Co., Milwaukee
Brown & Bigelow Co., St. Paul, Minn.
Geometric Tool Co., New Haven, Conn.
Chicago & North Western Ry. Shops, Chicago
Andrew Jergens Soap Co., Cincinnati
Montgomery-Ward Co., Kansas City, Mo.
Aluminum Co. of America, New Kensington, Pa.
Tom Boy Gold Mines Co., Telluride, Colo.
Cleveland Railway Co., Cleveland, O.

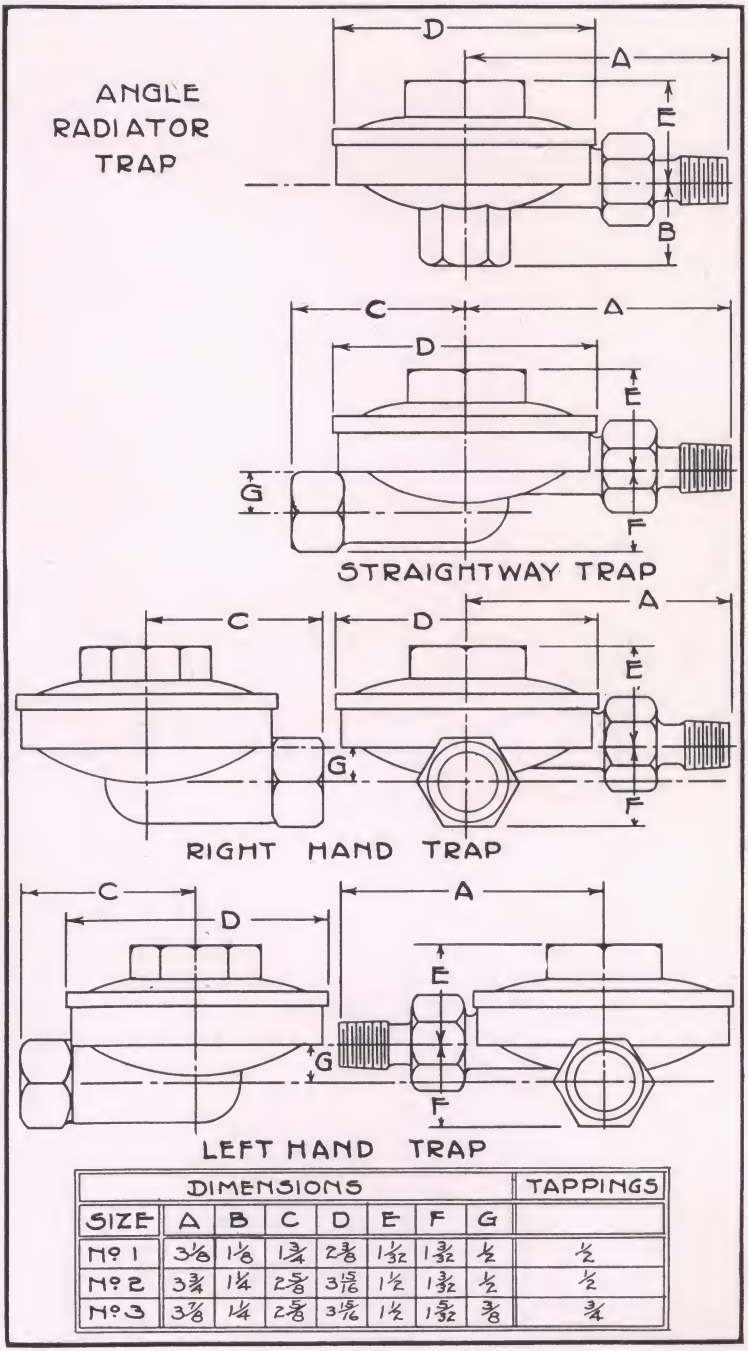
EDUCATIONAL INSTITUTIONS

Loyola University, Chicago, Ill.
Monmouth College, Monmouth, Ill.
State University of Iowa, Iowa City, Iowa
Immaculate Conception Academy, Davenport, Iowa
St. Catherine's College, St. Paul, Minn.
Indiana State Girls School Clermont, Ind.
St. Mary's College, St. Mary's, Kans.
State Agricultural College, Manhattan, Kans.
Central High School, Kansas City, Mo.
Ft. Worth High School, Ft. Worth, Texas
State University of Texas, Austin, Texas
Girls' High School, San Francisco, Cal.
Manual Training High School, Oakland, Cal.
State Normal School, Los Angles, Cal.
Polytechnic High School, Pasadena, Cal.
Lewis & Clark High School, Spokane, Wash.
Salt Lake City High School Salt Lake City, Utah
Boise High School, Boise, Idaho
The Dalles High School, The Dalles, Ore.
State Normal School, Cheney, Wash.
Shamokin High School, Shamokin, Pa.
Pennsylvania State College, State College, Pa.
East High School, Des Moines, Iowa
North High School, Des Moines, Iowa
Sioux City High School, Sioux City, Iowa
Iowa State College, Ames, Iowa
Highland Park School, Detroit, Mich.
West Technical High School, Cleveland, Ohio
Massillon High School, Massillon, Ohio
Owensboro High School, Owensboro, Ky.
Transylvania University, Lexington, Ky.
State Normal School, Hattiesburg, Miss.

HOSPITALS

Presbyterian Hospital, Chicago
Cook County Infirmary, Oak Forest, Ill.
Mercy Hospital, Davenport, Iowa
Eitel Hospital, Minneapolis
St. Barnabus Hospital, Minneapolis
Mudbaden Sanitarium, Jordan, Minn.
General Hospital, Devils Lake, N. D.
City Hospital, Indianapolis
Methodist Hospital, Indianapolis
Christian Church Hospital, Kansas City
German Hospital, Kansas City
State Insane Asylum, Austin, Texas
State Hospital, Stockton, Cal.
Mt. Sinai Hospital, New York City
Presbyterian Hospital, Pittsburg
Louisville Public Hospital, Louisville
Weld County Hospitals, Greeley, Colo.
Chronic Insane Asy'm Wauwatosa, Wis.
Citizens General Hospital, New Kensington, Pa.
Tuberculosis Sanitarium, Wauwatosa, Wis.

THE DUNHAM RADIATOR TRAP



DIMENSIONS								TAPPINGS
SIZE	A	B	C	D	E	F	G	
No 1	3 1/8	1 1/8	1 3/4	2 3/8	1 1/32	1 3/32	1/2	1/2
No 2	3 3/4	1 1/4	2 5/8	3 15/16	1 1/2	1 3/32	1/2	1/2
No 3	3 7/8	1 1/4	2 5/8	3 15/16	1 1/2	1 5/32	3/8	3/4

BULLETIN No. 11

(Revised from issue of July 15, 1914) April 15, 1915

C. A. Dunham Company

MARSHALLTOWN, IOWA

NEW YORK CHICAGO SAN FRANCISCO

Branch Offices in All the Principal Cities

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BULLETIN No. 9—The Dunham Reducing Pressure Valve and Vacuum Pump Governor.

BULLETIN No.10—Some Buildings where the Dunham Systems of Heating are now Installed.

THE DUNHAM VAPOR SYSTEM

Definition The C. A. Dunham Company proposes in this bulletin to describe the Dunham Vapor System of Heating. *It is a system entirely different from the Dunham Vacuo Vapor System.*

The Dunham Vapor System of Heating, as the name implies, is a system that utilizes steam at very low pressures above atmosphere for a heating medium.

By VAPOR is meant steam at very low pressures. You have noted, no doubt, the steam that escapes from the surface of a pan of water that is boiling on the stove. Well, that is the kind of steam that is called Vapor, and is the kind utilized in the Dunham Vapor System.

Utility of Vapor as a Heating Medium Vapor, that is, steam at a few ounces of pressure, is an ideal medium for heating purposes. It can be produced easily and quickly; it circulates readily and is easily regulated. It has a distinct advantage over hot water in that it responds more quickly and will not freeze. For instance, on a cold morning or when the house has been unoccupied for some time, vapor can be produced quickly and one does not have to shiver for an hour or so waiting for the radiators to warm. Then too, if you have a Dunham Vapor System in your house and want to shut up your house in the winter time, all you need to do is to draw the small quantity of water out of your boiler, a job requiring possibly ten minutes time. With hot water you are obliged to drain the entire system and refill it again upon returning. If you have ever done this you will appreciate what a difficult job it is.

Another advantage of vapor heating over hot water lies in the ability to shut off any radiator or radiators without the fear of their freezing. This point is especially important in apartment buildings where an apartment may be vacated in midwinter. With a hot water system, should the radiation in that apartment be shut off, freezing might follow. With a vapor system such radiation can be shut off and the fuel cost lessened proportionately.

Growth of Vapor Heating Vapor Heating is not new, yet its great advantage has only been generally recognized within the past few years. The reason for its recent rapid advancement is due to the new devices that have been created for handling it. For

years and years, and even back in the Colonial days, the practicability of vapor for heating purposes was recognized by some, but its use has been limited because of the unreliable devices heretofore used in connection with it. For instance, earlier systems required sizzling, property-destroying air valves on radiators—*the Dunham Vapor System absolutely does away with the necessity of having any air valves on radiators*—pounding in pipes—*Dunham Vapor System is absolutely noiseless*—poor control of pressure in boiler—*Dunham System positively controls the pressure in boiler*—rumbling noises in boiler—*Dunham System is absolutely noiseless and it is impossible to overheat water in boiler as with a hot water system*—high fuel cost—*Dunham System wastes no steam and all the water of condensation is carried back to the boiler for re-heating; therefore, there is no possible chance for promiscuous loss of heat units. Every heat unit absorbed by the water in the boiler is utilized.*

The elimination of all these annoying features which were so evident on former systems has brought vapor heating back to its own, and when the public learns of this, other forms of artificial heating of residences and apartment buildings will become obscure.

Attractive Features of Vapor Heating

Consider for a moment the ideal system of heating, and you will be surprised how closely the Dunham Vapor System approaches it.

Think what it means to have a heating plant in your home which, with almost human intelligence, keeps the temperature at the proper degree during the day, and at night after you have retired, automatically permits it to run down to 55 or 60 degrees, only to be raised again to 70 degrees an hour or so before you awake in the morning.

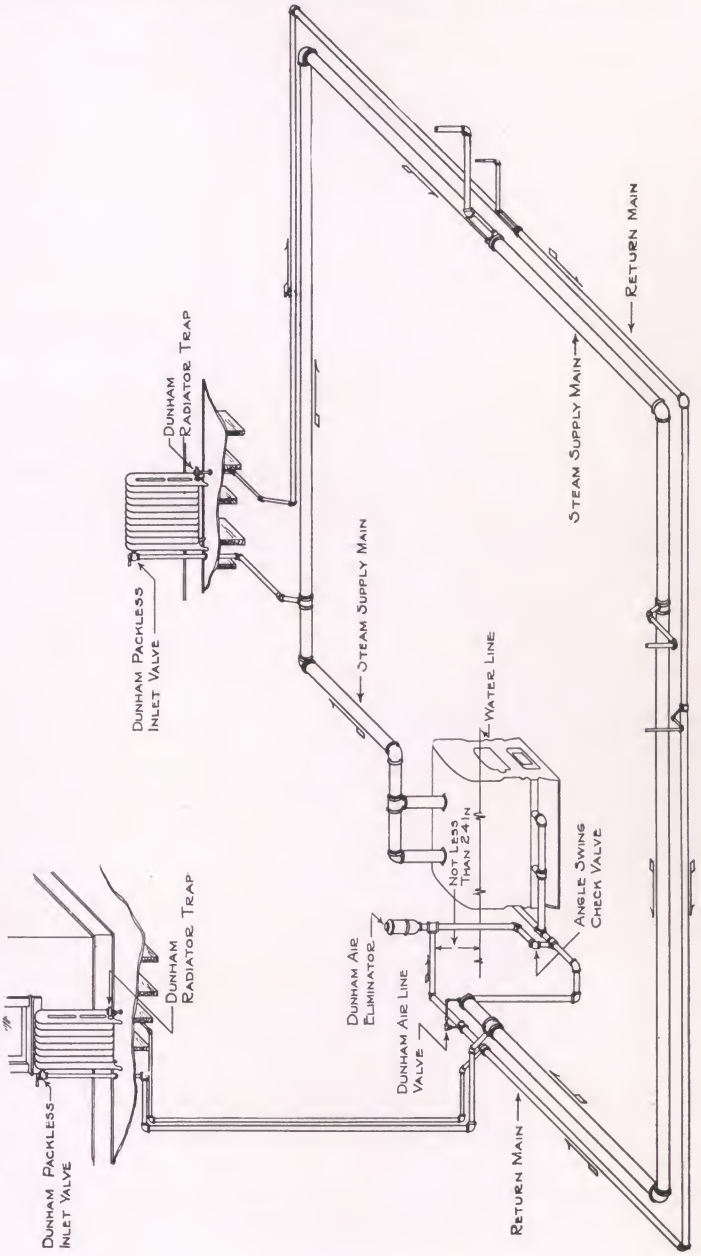
This is what the Dunham System does in that noiseless, yet positive way that leaves nothing to be desired, and it does it, too, with the least possible amount of coal.

It is the only system on the market that will do this, and what is more surprising is the fact that it is far less complicated in construction than other systems which do not even claim to accomplish those things that are accomplished by the "Dunham."

A perfectly governed apparatus has been brought about by our having applied the art of "cutting-across-lots" to secure

results without complicated mechanism, which has value only in confusing the public.

We have only to refer to the following description to substantiate our claim of simplicity and practicability of



every part of the Dunham Vapor System. The Dunham slogan in all the years gone by has been "Simplicity," and we propose to stick to that good old policy in the years to come.

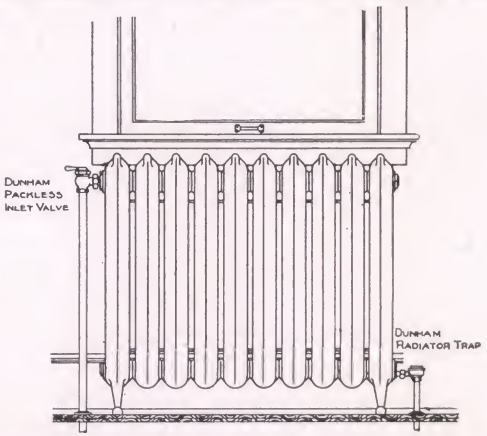
References Any user of a Dunham Vapor System will gladly tell you his opinion of it. We have a list of some hundreds of users from which we can select a few names of customers in your territory to whom you can call or write if you desire.

General Description The Dunham Vapor System is shown in simple diagram by cut, page 4. From that diagram you note that the supply piping from the boiler is run about the building in the most direct fashion. Likewise the return pipe which carries the condensation and air out of the radiators is simply planned and comes back to the boiler directly. Because of the Dunham Vapor System utilizing the well known Dunham Radiator Trap on the return from each radiator, thereby eliminating the possibility of vapor getting into the return pipe, there is no necessity of having any complicated mechanism in the boiler room to get the air out of the system. All we place on the return pipe in the boiler room is a check valve (See cut page 4) and a Dunham Air Eliminator (See cut page 4). With other vapor systems using a ball check, water seal elbow, or other makeshift device on the return from the radiator, it is almost impossible to keep the vapor out of the return pipe. Vapor in the return pipe hampers the radiators from being quickly vented of air, and when a radiator is not entirely freed of air it will not heat up. Other vapor systems try vainly to supply devices on the return pipe near the boiler to get rid of the vapor in the return pipe, but such devices only add complication and extra expense.

With the Dunham Vapor System the application of the Dunham Radiator Trap (See page 10) causes the vapor to be held in the radiator where it belongs. Nothing is discharged into the return line but the water of condensation and air. The air so discharged is vented to the atmosphere by the Dunham Air Eliminator and the water is delivered back into the boiler to be heated over again. Thus you see there is no loss of water in the Dunham Vapor System. The same water is heated over and over again. And again, there is no loss of vapor. Every bit of it is held in the radiator until it gives up its heat and changes back to water.

From what has already been said you can see that the Dunham Vapor System is the acme of simplicity. Piping plan is simple and the devices used in connection with it are few and very simply constructed. *Any fitter who knows how to install piping can install the Dunham Vapor System.*

So far in our general description (and farther on we will describe more in detail the specific devices which make possible the Dunham Vapor System) we have dwelt in length upon the simplicity of the Dunham Vapor System in the boiler room. Now let us carry our discussion to the rooms to be heated. In the rooms to be heated are the radiators. (See cut of radiator connections below.) These radiators should be of the hot water type (a steam type radiator can be used but we recommend the hot water type as being much better). The supply valve to each radiator is placed at the top where it is convenient. This valve is of the Dunham make, absolutely leak-proof and packless and has a lever handle. A simple movement of the lever handle permits the amount of heat given off by the radiator to be varied to suit the occupant of the room. On the opposite end of each radiator at the bottom is the Dunham Radiator Trap. This trap automatically keeps the vapor in the radiator until it is condensed, but allows all air and water in the radiator to pass out into the return line. *No air valves are used on the radiators.* All the air is passed into the return line and carried to the Air Eliminator in the basement where it is discharged. Thus you see that every possible precaution is taken to make the radiators in the rooms so thoroughly sealed that air, vapor or water cannot get out on the floors, walls or rugs. Nothing short of a broken pipe or radiator could cause this to take place.



Distinguishing Features

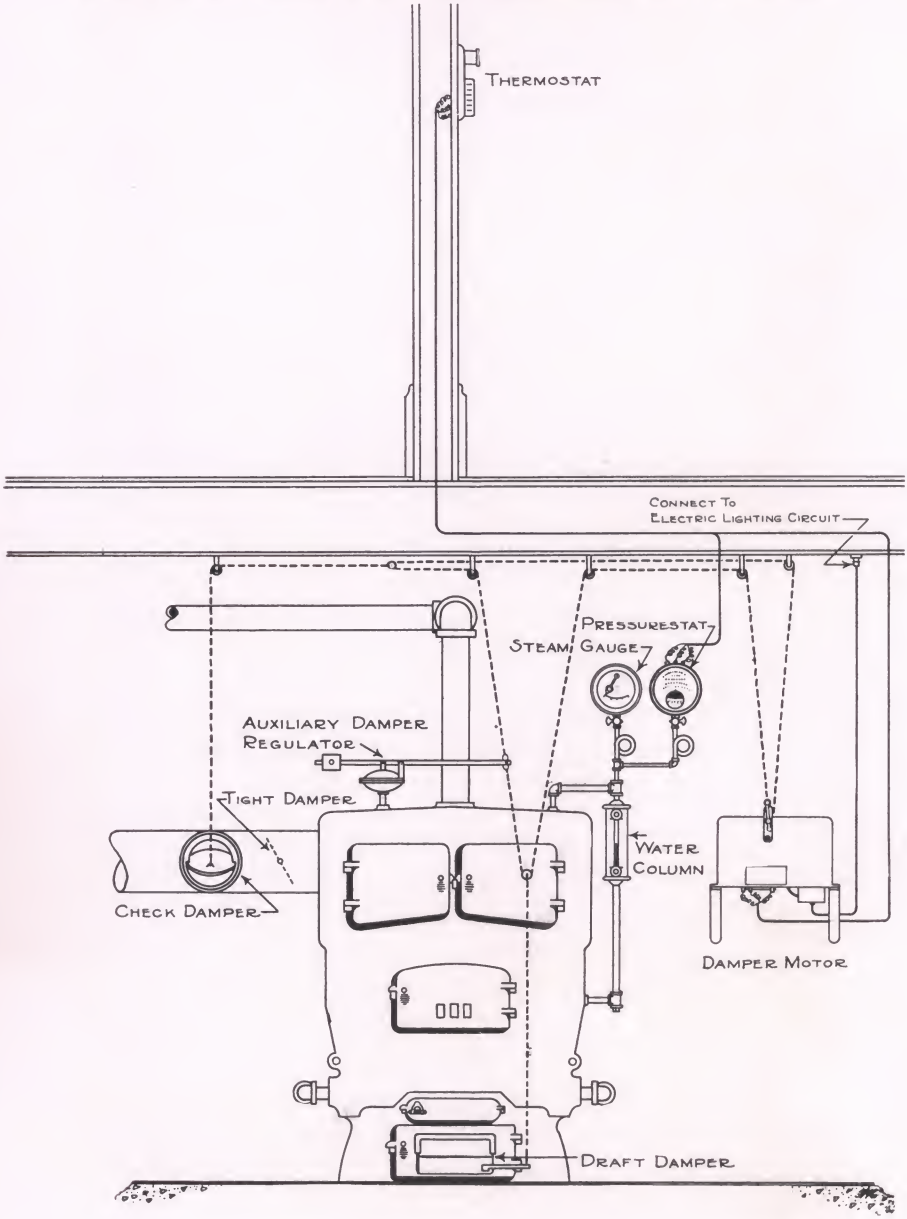
Now we come to the notable and distinct feature of the Dunham Vapor System. It is the Pressurestat and Damper Motor that control the pressure on the boiler. The Pressurestat and Damper Motor are designed so that in addition to controlling the pressure on the boiler they will, by

the simple addition of a Thermostat, (See cut page 12) regulate the temperature in the rooms above. The Pressurestat is placed on the boiler (See cut page 8) and when the pressure in the boiler rises to, say, six ounces, it trips the Damper Motor which in turn closes the draft damper on the boiler. (When we speak hereafter of the draft and boiler dampers being closed we mean that the draft damper is closed and the check damper at the rear of the boiler is open.) Then when the pressure in the boiler falls, say, two ounces, the Pressurestat trips the same Damper Motor again and in turn the draft damper opens. (The points of tripping can be varied by a simple adjustment of the Pressurestat.)

You probably wonder how this mechanism can also govern the temperature of the rooms above. This is easy. In a room above is located a Thermostat (See cut page 8). When the temperature runs up to, say, 72 degrees, this Thermostat trips the same Damper Motor that is connected to the boiler dampers and the draft dampers on the boiler are closed. When the room temperature drops to, say, 70 degrees, the Thermostat trips the Damper Motor again and the draft damper opens. (The points of tripping can be varied by a little thumb nut and dial on Thermostat.) Even if the room temperature above is not up to the point where the Thermostat will trip, the dampers will close just the same, if the pressure rises to the point where the Pressurestat is set. This is a precaution in behalf of safety, for it might require some time for the room to get up to temperature and in that time the pressure on the boiler might run up. So the Dunham Pressurestat regulates the pressure on the boiler and keeps it from running too high, while the Thermostat controls and regulates the temperature of the room. Have we made the above perfectly plain? We believe we have.

Refer to cut, page 8. You see the Thermostat placed in the room above. You see the Pressurestat located on the boiler. You see the Damper Motor in the boiler room. (This Damper Motor is the little mechanism which opens and closes the draft and check dampers on the boiler. It is operated either by electric dry cell batteries, or by the lighting current in the house. When the lighting current is used a small transformer is furnished.) The Thermostat trips the Damper Motor when the temperature in the room rises or falls to certain points. The Pressurestat trips the Damper Motor when the pressure on the boiler rises or falls to certain points.

You probably wonder how the Thermostat and Pressurestat trip the Damper Motor. Refer again to cut below. See the connection from the electric lighting circuit to the Motor through the transformer. This electric current passes from the Motor through cables to both the Pressurestat and Thermostat.



When the Thermostat or Pressurestat reach certain points where you want the boiler dampers to close, an electric circuit is completed which in turn actuates a little magnet in the Damper Motor and the Motor operates.

What will happen if the electric current should give out when you are out of the house, do you ask? You still have the auxiliary damper regulator (See cut page 8) left and it will take care of your boiler until you get new batteries (batteries last, at least, one season and are very inexpensive to replace) or until the current in your house comes on again. Remember right here, too, that other systems on the market only supply a damper regulator similar to the one that we use as an auxiliary, so from this you can readily see that our apparatus is as fool-proof as it is possible to make it. The trouble with most damper regulators is that they are not sensitive enough and this is the detriment we absolutely overcome by use of the Pressurestat which can be set to operate the dampers at one ounce of pressure on the boiler.

Keep in mind that the points at which the Pressurestat will operate the dampers can be varied to suit weather conditions. In the early fall or late spring when less heat is required the vapor pressure on the boiler can be held at two or three ounces. In cold winter weather the pressure can be increased to eight or ten ounces. This is a very important feature, and one that means a big saving of fuel. No other system ever marketed permits of such delicate yet definite adjustment.

Another thing, too, for you to remember is that the points at which the Thermostat will operate the dampers can be varied. (See page 12).

The Dunham Vapor Specialties

The specialties furnished by the C. A. Dunham Company and that make possible the Dunham Vapor System are as follows: Dunham Radiator Traps, Dunham Packless Inlet Valves, Dunham Air Eliminator, Dunham Damper Motor, with Cable, Pulleys and Batteries or Transformer, as required, Dunham Pressurestat, Dunham Thermostat, and Dunham Check Damper.

Sufficient wire to fully connect the entire apparatus is furnished with the above, also wiring and installation diagrams with full instructions, so that even the most inexperienced layman can connect everything up.

Before going further, however, let us say that if you prefer not to install the Thermostat you need not buy that article and the system will not cost so much. All the other apparatus is necessary.

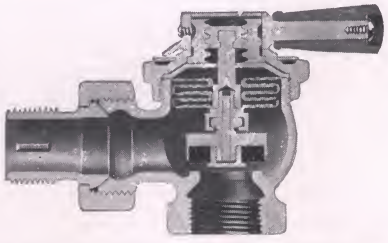
We will now proceed with a description of each of the above specialties.

Dunham Radiator Trap

The Dunham Radiator Trap is the little device that is connected to the bottom of the return end of each radiator for the purpose of letting all water and air out of the radiator without loss of steam. Its function is so important that it becomes a necessity when attempting to make any vapor system operate successfully. This is the little device that has made the great reputation of the C. A. Dunham Company. The Dunham Radiator Trap is a standard the country over and hundreds of thousands of them are in use in some of the finest and most imposing buildings on this continent. It revolutionized the principle of radiator trap manufacture. After it came on the market it gave such splendid results that every competitor attempted to copy it. An article of merit sufficient to convince competitors, we believe should commend itself to the most fastidious buyer, particularly so when it has stood the test of so many years of service. This trap will be furnished nickel plated if desired.

Dunham Packless Inlet Valve

The Dunham Packless Inlet Valve is for use in turning the steam on and off the radiator. Note its construction. It has no stuffing boxes, like other valves, that are likely to leak. It is constructed of the very best of steam metal and comes regularly nickel plated all over with polished trimmings. This valve has a lever handle and is installed at the top of the radiator where it is convenient. Seven-eighths turn of the handle entirely opens or closes this valve.



Dunham Damper Motor

The Dunham Damper Motor is operated by electricity or by a stout spring, as is preferred by the user. The Damper Motor operates the boiler dampers in response to the directions of the Thermostat and Pressurestat, which set it in motion. It is durably built, positive in action and has been in successful use for many years on temperature controlling devices.

Dunham Air Eliminator

The Dunham Air Eliminator is used on the junction of the return lines in the boiler room. (See cut page 4.) Its mission is to discharge all air from the system. It is constructed so that the presence of water around the float will close a little valve to prohibit water from getting out in the basement. It isn't probable that water will get into the valve, but in case it does, such as where the boiler primes badly, the Air Eliminator keeps any water from getting out on the basement floor.

Dunham Pressurestat

The Dunham Pressurestat is nothing more or less than a sensitive pressure gauge. It is connected directly to the boiler. You will note two little pegs or stops in the segment traversed by the gauge hand. When the gauge hand comes in contact with the right hand stop an electric contact is made which in turntrips the Damper Motor and the boiler drafts are closed. Then when the pressure on the boiler falls and the gauge hand touches the left hand stop the Damper Motor is tripped again and the boiler dampers are opened. The device is very durably built and is positive in its operation. The Pressurestat does not indicate the pressure on the boiler except between the two points at which it is set.

Dunham Thermostat

The Dunham Thermostat is supplied with an eight-day clock that automatically "sets back" at night and "up" in the morning. By "sets back" and "sets up" we mean that a certain time in the evening, say ten, eleven or twelve o'clock, it closes off the boiler drafts and permits the house to gradually cool down to fifty-five degrees; then in the morning at four, five, six or seven o'clock it automatically opens the boiler drafts and permits the house to gradually heat up to seventy degrees. The hour of "set back" and "set up" can be varied to suit the occupant of the house.

The Thermostat is only nine and one-fourth inches high over all; is finished in "sand-blast" brass and is very ornamental in appearance.

The Thermostat is hardly applicable to buildings occupied by more than one tenant. This would apply to such buildings as apartments, double store buildings, or double residences. The reason for this lies in the fact that one occupant might not be satisfied with the temperature desired by another. *And two Thermostats cannot be applied to one heating system.*

In buildings occupied wholly by one tenant the Thermostat should be placed about five feet from the floor on an inside wall and in a room (preferably living room) having an average temperature. Care should be exercised to avoid placing it near chimneys, radiators, hot pipes (exposed or concealed), near windows or where it will be exposed to cold drafts. Neither should it be placed where there is not a free circulation of air, as behind doors. The most convenient place is usually beside the casing of an inside door on the side where it will not be hidden when door is open.

Dunham Check Damper

This special Check Damper is supplied in order that the boiler may be more easily regulated in response to the closing of the draft damper. It checks the combustion by lowering the chimney temperature and reducing the draft.

BULLETIN No. 12

Oct. 15, 1915

C. A. Dunham Company

MARSHALLTOWN, IOWA

NEW YORK CHICAGO SAN FRANCISCO

Branch Offices in All the Principal Cities

(This Bulletin supersedes all information covering same subject heretofore published by us.)

SUBJECT

The Dunham Packless Inlet Valve

AND ITS APPLICATION

OTHER BULLETINS WHICH MAY BE HAD ON APPLICATION ARE

BULLETIN No. 1—The Dunham Vacuo Vapor System of Heating—What it is—How it Operates.

BULLETIN No. 2—Advantages of Steam for Heating—Why the Dunham Vacuo Vapor System is Superior.

BULLETIN No. 3—How to Install the Dunham Vacuo Vapor System of Heating.

BULLETIN No. 4—How to Operate the Dunham Vacuo Vapor System of Heating.

BULLETIN No. 5—The Dunham Radiator Trap and its Application.

BULLETIN No. 6—The Dunham Blast Trap and its Application.

BULLETIN No. 7—The Dunham Air Line Valve and its Application.

BULLETIN No. 8—Dunham Traps for High Pressure Service.

BULLETIN No. 9—The Dunham Reducing Pressure Valve and Vacuum Pump Governor.

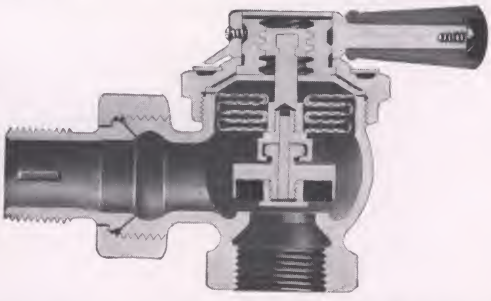
BULLETIN No.10—Some Buildings where the Dunham Systems of Heating are now Installed.

BULLETIN No.11—The Dunham Vapor System.

THE DUNHAM PACKLESS INLET VALVE

Introduction The Dunham Packless Inlet Valve is all that the name implies. It is really a packless valve. No packing of any kind is used in its construction (see cut below). In designing this valve the C. A. Dunham Co. kept in mind; first, utility; second, appearance; and third, the feature of quick opening and closing. The Dunham Inlet Valve is made of the very best material that can be procured. It is neat in appearance, in fact no valve on the market can compete with it in this respect. It is an ornament to any room regardless of the furnishings and architecture. It also has the very desirable feature of quick opening and closing. The Dunham Packless Inlet Valve can be fully opened or closed with a seven-eighths turn of the handle. All of these features are of extreme importance to the person who is seeking a supply valve to his radiator that harmonizes with the architectural embellishments of his home; a valve that needs no attention after once having been installed, and a valve that can be easily and quickly operated.

Description The Dunham Packless Inlet Valve (see cut below) utilizes a series of diaphragms for allowing the free up and down movement of the spindle without steam leakage. A weak feature of many of the supply valves of the past has been the danger of leakage around the handle.

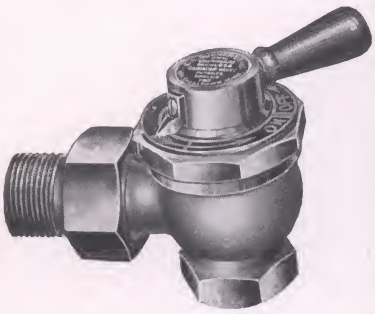


In the Dunham valve the series of diaphragms above mentioned entirely obviate the possibility of such leakage and it is accomplished without the use of any packing or stuffing boxes of any kind. Even to a person little accustomed to the handling of valves this feature will appear most practicable and sensible. And the prohibition of leakage as above described is not the sole advantage of such a diaphragm construction. There is also the advantage of no steam or water or dirt from the heating system coming in contact with the threads of the handle and making them hard to operate. We insert hard oil in the chamber on the upper side of the diaphragm to keep the threads permanently lubricated and make the handle operate easily.

The body of the valve is constructed of pure red brass, the handle of cocabola, and the diaphragms of a specially constructed metal which offers the greatest resilience and durability.

THE DUNHAM PACKLESS INLET VALVE

The Dunham Packless Inlet Valve is not made in the graduated type although it is equipped with plate and indicator showing when valve is "On" and "Off." The C. A. Dunham Company does not believe in the possibility, as propounded by some manufacturers, of graduating the supply of steam to radiators. They believe that the amount of steam that will flow through a certain orifice is dependant upon the differential in pressure as between one side of that orifice and the other. In a heating system that differential is beyond the control of the operator. It is next to impossible to maintain an absolutely constant pressure of steam upon the boiler and it is absolutely impossible to regulate accurately the condensing powers of the radiator. Some concerns claim that they are able to positively regulate the pressure upon the boiler but no one claims to be able to establish a constancy in the outside weather conditions which changing also change the condensing capacity of the radiator. Aside from this, the C. A. Dunham Company maintain that the graduating feature even if practical, would not be used in the manner intended. When a room in a building becomes chilly, the inlet valve is not graduated but opened full wide so that the temperature of the room will be brought back to the proper point as quickly as possible. Likewise, if the room becomes too warm, the operator will close the valve entirely so that the room will cool off as quickly as possible. Therefore, we make no claims for the graduated valve feature, although as constructed, our valve can be partially opened or closed at will, thus restricting the flow of steam to the radiator the same as is claimed for other valves.



Application The Dunham Packless Inlet Valve can be used on any two-pipe steam heating system, either vapor, vacuum or pressure. It is made in the angle pattern lever handled type *only*, and for that reason we recommend it only for radiators with top connection. It will operate just as satisfactorily when connected to the bottom of radiators but there is the danger of handles being bent or broken.

Another reason for installing the valve at the top of radiators is due to the fact that it gives the valve a slightly larger capacity, due to the aspirating action of the steam after entering the radiators.

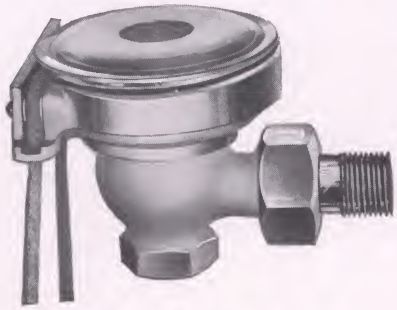
THE DUNHAM PACKLESS INLET VALVE

The Dunham Valve is not applicable to hot water heating plants or to one-pipe steam plants.

Capacities The Dunham Packless Inlet Valve when applied to radiators with top connections, has the following capacities on vapor, vacuum and gravity steam heating work:

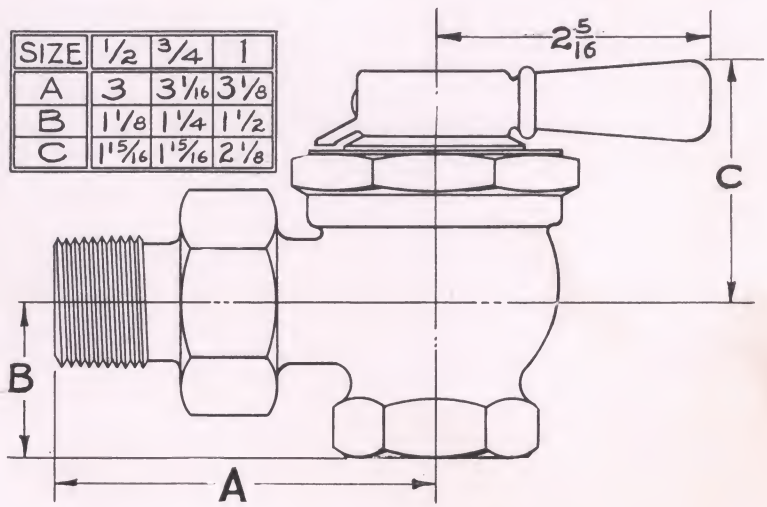
½ in.—Up to 40 sq. ft. direct radiation
¾ in.— 41 to 100 " " " "
1 in.—101 to 180 " " " "

Dunham Packless Ceiling Valve The Dunham Packless Inlet Valve is made in what is termed the CEILING TYPE, for use on radiators attached to ceilings. This valve is identical in construction with our regular pattern valve, except that it is supplied with a special cover casting enabling the valve to be opened and closed from the floor by means of cords. There is a large demand for this type of valve for use in basements where often it is necessary to install radiators on the ceiling.



ROUGHING—IN DIMENSIONS DUNHAM PACKLESS INLET VALVE

SIZE	½	¾	1
A	3	3 1/16	3 1/8
B	1 1/8	1 1/4	1 1/2
C	1 5/16	1 5/16	2 1/8



BULLETIN No. 13

June 1, 1916

C. A. Dunham Company

MARSHALLTOWN, IOWA

NEW YORK CHICAGO SAN FRANCISCO

Branch Offices in All the Principal Cities

(This Bulletin supersedes all information covering same subject heretofore published by us.)

SUBJECT

How to Install The Dunham Vapor Heating System

OTHER BULLETINS WHICH MAY BE HAD ON APPLICATION ARE

BULLETIN No. 1—The Dunham Vacuo Vapor System of Heating—What it is—How it Operates.

BULLETIN No. 2—Advantages of Steam for Heating—Why the Dunham Vacuo Vapor System is Superior.

BULLETIN No. 3—How to Install the Dunham Vacuo Vapor System of Heating.

BULLETIN No. 4—How to Operate the Dunham Vacuo Vapor System of Heating.

BULLETIN No. 5—The Dunham Radiator Trap and its Application.

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BULLETIN No. 7—The Dunham Air Line Valve and its Application.

BULLETIN No. 9—The Dunham Reducing Pressure Valve and Vacuum Pump Governor.

BULLETIN No.10—Some Buildings where the Dunham Systems of Heating are now Installed.

BULLETIN No.11—The Dunham Vapor System.

BULLETIN No.12—The Dunham Packless Inlet Valve.

As a Heating Contractor, you look with pride upon a good heating job of your own making. To aid you in this quest for success, these instructions applying to the Dunham Vapor Heating System have been prepared. We commend them to your thoughtful attention.

Location of Boiler

Locate the boiler as near the chimney flue as possible, so as to admit the use of the shortest and most direct smoke pipe connection. Face the boiler to give easiest access to coal supply. Make sure that there is opportunity for a sufficient supply of air to the boiler room from the outside. A crowded boiler room into which air finds its way with difficulty, hampers and in some cases destroys free combustion of the fuel. Remember *air is essential* to proper fuel combustion and draft.

Capacity of Boiler

No larger boiler is required by the Dunham Vapor System than for any first class steam heating system. Good fuel economy will not follow the use of a boiler that is too small.

All boilers are rated by the manufacturers for standard cast iron direct radiation, and the following *allowances* must be made for Pipe Coil Radiation, Direct-indirect Radiation, Indirect Radiation and for the heating of water for the domestic supply.

The allowances recommended are as follows:

(a) Each square foot of direct Pipe Coil Radiation is equivalent to 1¼ square feet of direct radiation.

(b) Each square foot of Direct-indirect Radiation is equivalent to 1⅓ square feet of direct radiation.

(c) Each square foot of Indirect Radiation is equivalent to two (2) square feet of direct radiation.

(d) Each gallon of capacity of tank for domestic hot water supply is equivalent to two (2) square feet of direct radiation.

When all classes of radiation have been reduced to equivalent cast iron direct radiation and the total obtained, obtain the boiler capacity from Curve on the Boiler and Chimney Chart, Figure No. 1. This curve makes full allowance for all piping. If the steam main is to remain uncovered, a boiler ten per cent. larger should be used.

Most cast iron sectional boilers are rated upon anthracite coal as fuel. If bituminous coal is to be used, the boiler manufacturers' instructions to use a boiler one size larger should be followed.

Chimney The chimney size is of the utmost importance. A round chimney is the best form, but if this is not practical, then it should be as nearly square as possible. Avoid a rectangular chimney where the short side is less than half the length of the long side. The heating boiler should have a chimney of its own with absolutely no other smoke connections into it. Chimney should extend above highest point of roof.

The chimney sizes for boilers of various capacities are given on the Boiler and Chimney Chart, Figure No. 1.

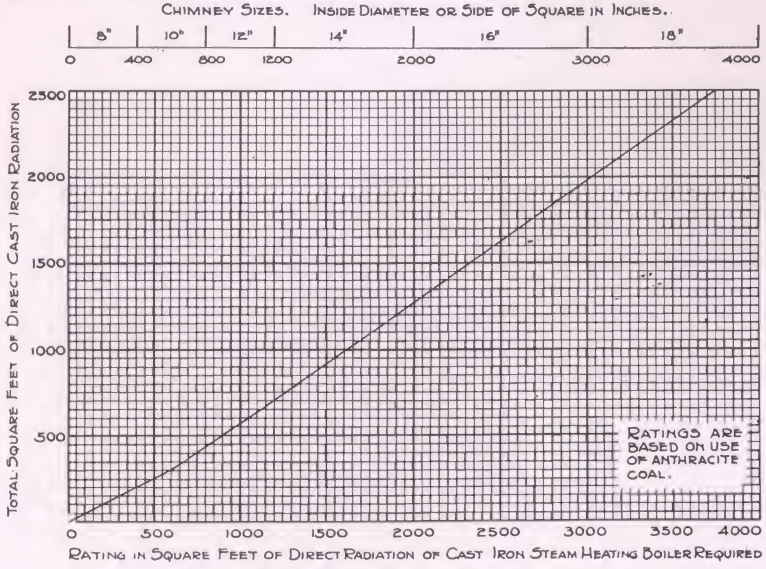


Figure No. 1—Boiler and Chimney Chart

Smoke Pipe The smoke pipe should be the same size as outlet from boiler, as short and direct as possible, free from avoidable bends, and have slight upward slope toward the chimney. A tight fitting, easy moving stop damper for hand control must be placed in smoke connection near boiler.

Balanced Check Damper In addition to the stop damper above mentioned, a liberal sized balanced check damper should be installed in the smoke pipe between stop damper and chimney. The ordinary check damper furnished as a part of the boiler equipment is usually very small and does not sufficiently check the fire. A Balanced Check Damper of proper size, with suitable collar for bolting to the smoke pipe, is furnished with the Dunham Specialties.

DUNHAM VAPOR HEATING SYSTEM

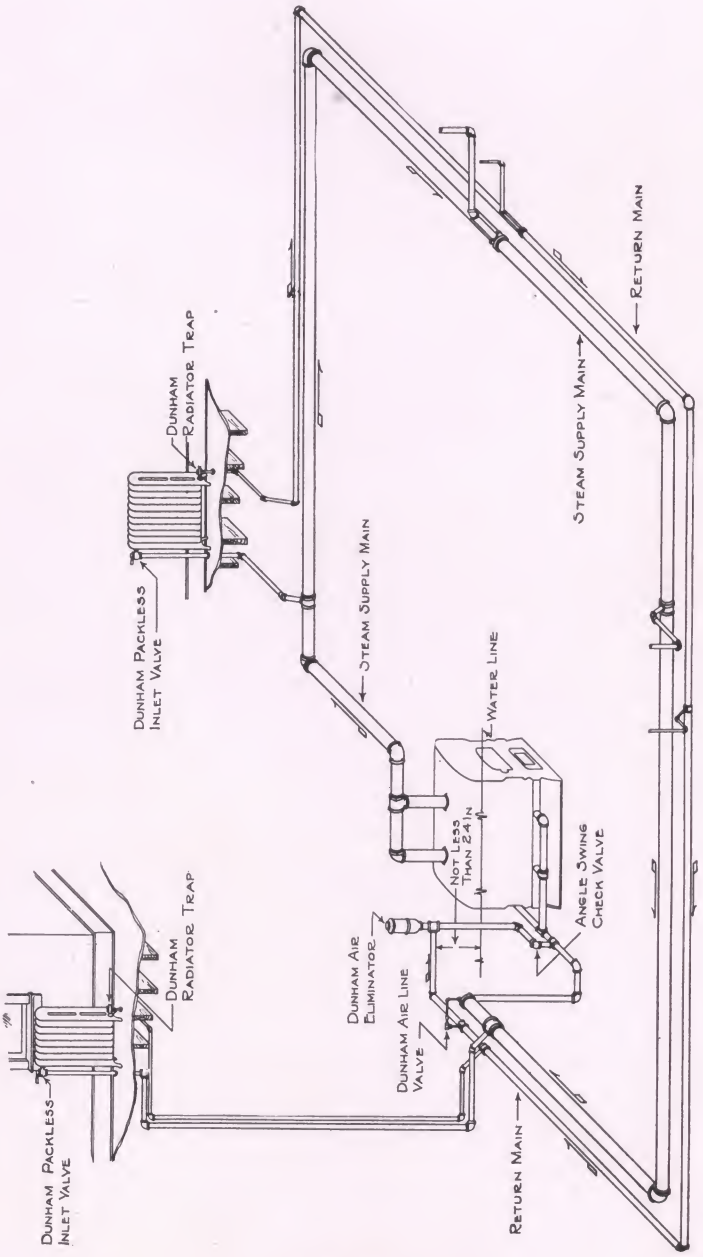


Figure No. 2

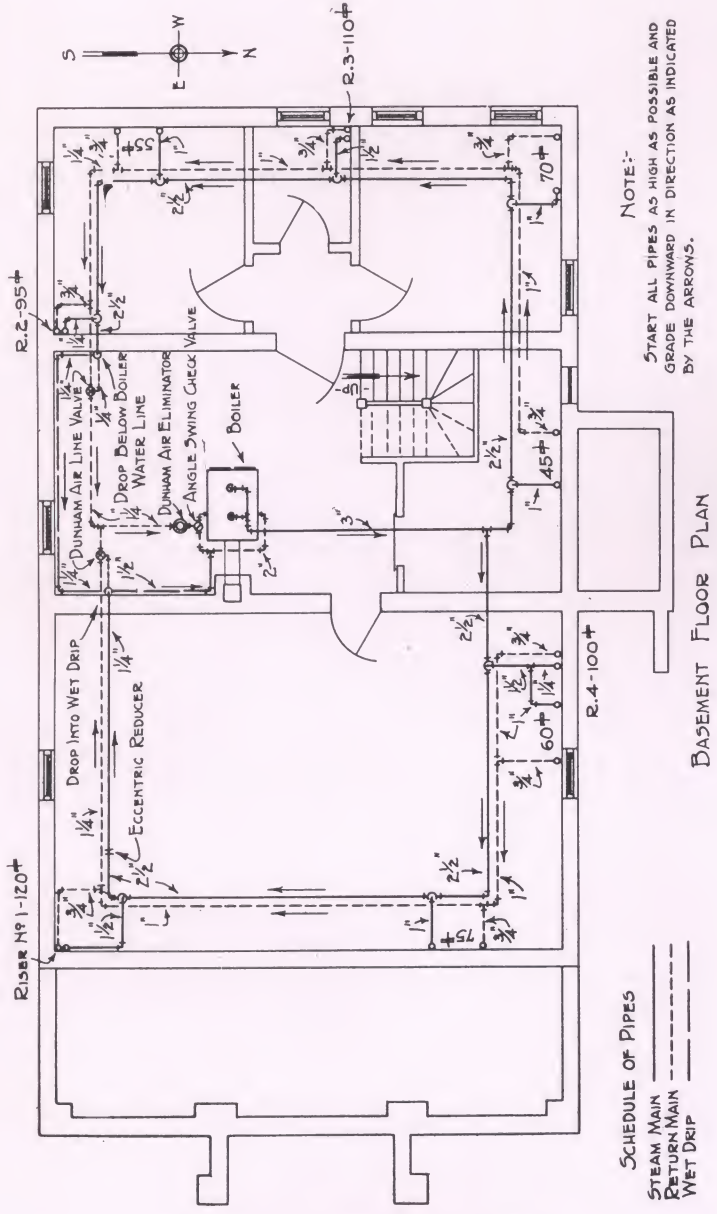


Figure No. 3—Specimen Basement Layout

Steam Piping The secret of a nice circulating steam heating apparatus is in the piping. The piping to and from the boiler should be liberal in size and well equalized.

All steam tappings in boiler should be used with full sized header into which the steam mains connect.

At least two or more return tappings, one or more on each side of boiler, should be used, and these connected together by a liberal header.

The bleeding or dripping of the main steam header into the main return by a large pipe for equalization is also an excellent practice.

If a screw nipple or header type of cast iron sectional boiler is used, the boiler steam header should be connected with the boiler return headers on both sides of the boiler by a yoke of liberal sized piping. This is to drip the steam header and equalize the boiler.

The steam mains should be installed with high point at the boiler and pitch downward with a grade in the direction of flow of not less than ½ inch in ten (10) feet, with such provision for expansion that the grade is not destroyed when the steam is circulating through them.

A steam main circuit starting three (3) inches in size or smaller should not be reduced, but should be carried full size to end of circuit. Steam mains starting larger than three (3) inches in size may be reduced in proportion as radiation is taken off, down to three (3) inches in size, and then continued without further reduction to end of circuit.

The ends of all main steam circuits should be dripped separately into a wet return leading back to boiler, and should also be vented into a dry return as per detail, Figure No. 4. Do not connect the ends of two circuits together above the waterline. Both should be sealed.

Spring pieces to risers or radiators should be taken from top of steam main at an angle of 45 degrees. Spring pieces longer than eight (8) feet should be avoided. See that spring piece has good fall toward steam main and that it does not form a pocket at base of riser.

The return piping should be graded back to the boiler with a fall of at least one (1) inch in ten (10) feet, and should be carried as near ceiling as possible.

Two or more branch return mains should be joined in one main return before being connected into vertical pipe leading to return header of boiler.

Angle Swing Check Valve

An angle swing check valve should be installed in verticle stand pipe as per detail Figure No. 5. If it is impossible to secure an angle swing check, then a *horizontal swing* check may be used instead. *Never* use a vertical check valve.

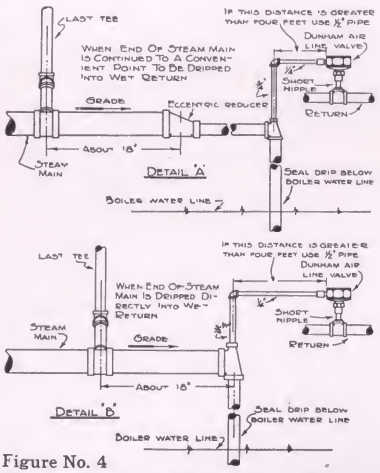


Figure No. 4
Method of Venting End of Steam Mains

IMPORTANT. The end of the main return in the boiler room should be at least twenty-four *(24)* inches above water line of boiler and as much greater as possible. See Figure No. 5. Check this very carefully and see that you have not less than 24 inches. Before starting the installation work endeavor to determine how the return main may be installed to give proper pitch and yet reach the boiler room at the very greatest distance above the boiler water line.

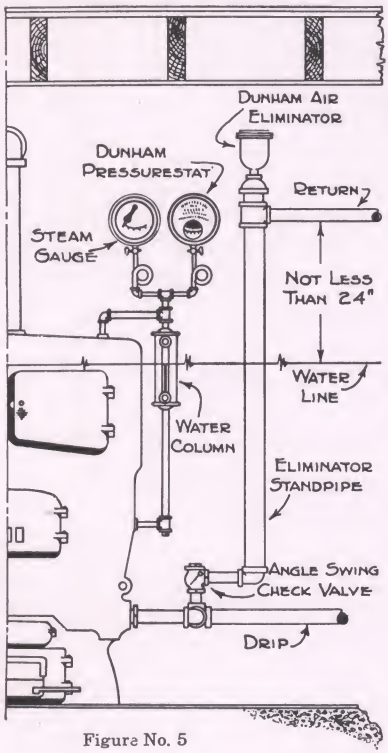


Figure No. 5

Dunham Air Eliminator

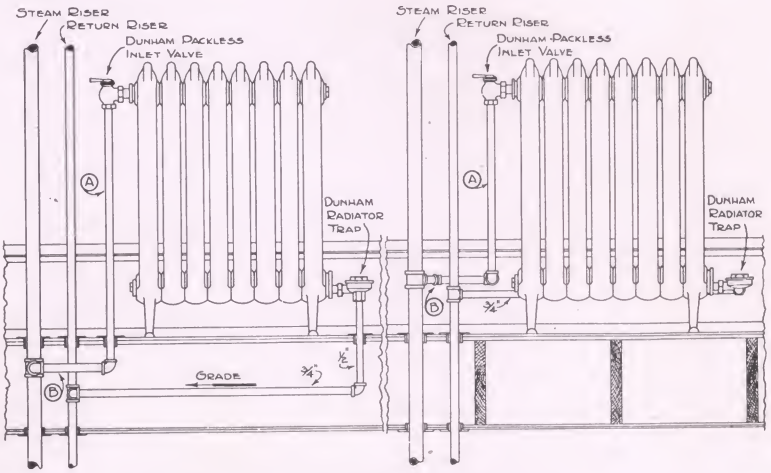
The Dunham Air Eliminator has a capacity for removing the air from 2000 square feet of direct radiation. One or more eliminators, as may be required, should be installed on the vertical standpipe where return main drops to return header of boiler, as per Figure No. 5.

Radiator Connections

It is preferable to use hot water type radiators with supply connection at top and return connection at opposite end at bottom. See Figure No. 6 for proper connections, and

also for sizes of traps and inlet valves required.

It is the best practise to locate radiators under windows or along outside walls.



RADIATOR CONNECTIONS—INLET AT TOP ONLY

SQ. FT. OF RADIATION	INLET VALVE	VERTICAL PIPE "A"	HORIZONTAL PIPE "B"	TRAP
1 TO 40	½"	½"	¾"	Nº 1
41 TO 100	¾"	¾"	1"	Nº 1
101 TO 180	1"	1"	1¼"	Nº 2

ALL RADIATOR TRAPS TO HAVE ½" CONNECTIONS AND ¾" HORIZONTAL RUN-OUTS

Figure No. 6—Detail of Radiator Connections

Inlet Valves and Radiator Traps

A Dunham Packless Inlet Valve should be installed on the supply end of each radiator at the top, and a Dunham Radiator Trap should be installed on the return end of each radiator at the bottom.

The roughing-in dimensions for Dunham Packless Inlet Valves and Dunham Radiator Traps are given in Figures Nos. 7 and 8.

SIZE	½	¾	1
A	3	3 1/16	3 1/8
B	1 1/8	1 1/4	1 1/2
C	1 5/16	1 5/16	2 1/8

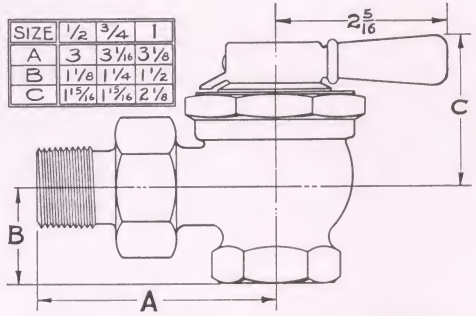


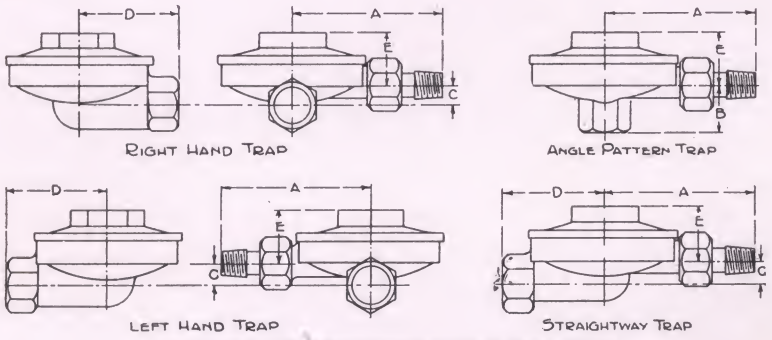
Figure No. 7—The Dunham Packless Inlet Valve

Testing

When all the piping has been installed and all radiators connected, the system should be given a test for leaks under water pressure of ten (10) pounds.

Covering All steam mains and spring pieces in basement should be covered with asbestos air cell covering one (1) inch in thickness.

Boiler should be covered with asbestos cement two (2) inches thick.



DIMENSIONS IN INCHES						
SIZE	A	B	C	D	E	TAPPINGS
NUMBER 1	3 1/8	1 1/8	1/2	1 3/4	1 3/32	1/2
NUMBER 2	3 3/4	1 1/4	1/2	2 5/8	1 1/2	1/2
NUMBER 3	3 7/8	1 1/4	3/8	2 5/8	1 1/2	3/4

Figure No. 8—The Dunham Radiator Trap

Notice The Pressurestat, Damper Motor and Thermostat, which are termed the Boiler Room Attachments, should not be installed until the system has been thoroughly tested out for leaks and also thoroughly cleaned out.

When ready to install these Attachments, be sure to read the following directions very carefully before proceeding with the work.

Damper Motor Fasten Damper Motor securely to boiler room wall about five feet from floor, on inside wall if possible. Screws and brackets for this purpose will be found in box with Motor.

If Motor is of *Alternating Current* type to operate on the house lighting circuit, be sure to see that there is a line running to the Motor upon which the current is never turned off. It is best to consult a competent electrician about this if you are not one yourself. Do not take any chances.

Alternating current motors are furnished in two types, one for 110 volt, 60 cycle service, and the other for 110 volt, 25 cycle service. *Be sure that motor furnished is suitable for current available.*

This alternating current type of Motor is equipped with a small transformer already attached to base of Motor. Two short wires will be found protruding from this transformer and to these two wires should be connected the two wires coming from the Alternating Lighting Circuit. These connections should be soldered and thoroughly taped.

If damper Motor is of the *Direct Current Non-Wind Type,* to be operated by batteries, or of the *Spring Type* where batteries are used for tripping same, the wiring connections are as follows: Fasten battery basket to wall underneath Motor, connect batteries together in usual manner and then connect (using the two-wire cable furnished) to the two uncolored posts on the wall side of the bottom of Motor.

Pressurestat Place the Pressurestat beside the steam gauge, installing same with syphon or "pig tail" and gauge cock. Pressurestat should be above all parts of the piping which connects it to the boiler so as not to be affected by any head of water. It can be installed above the water column as suggested in Figures No. 5 and 9. It is very important that the gauge cock which comes with the Pressurestat be installed in the connection between it and the boiler. If system is given a blowing off, after installation of Pressurestat, be sure to shut off the gauge cock between it and boiler to avoid allowing excessive pressures to come in contact with it.

Wiring Pressurestat and Damper Motor

(Where no Thermostat is used)

A long piece of three-wire cable will be found in box for this purpose. Remove insulation for one *(1)* inch on each end of three wires on both ends of cable. Take either end and connect to Pressurestat as follows: The red wire to the post marked "Red," the white wire to the post marked "White," and the blue wire to the post marked "Blue." Be sure to see that each connection is solid and well taped to prevent short circuiting.

Then run cable up to ceiling and over and down to Motor. Connect red wire to red binding post on Motor, white wire to white post, and blue wire to blue post, being sure to tape all connections.

When all connections are made to Motor and Pressurestat and the current is turned on, the Motor will operate once and assume its normal position, if it was not in this position before being connected to the lighting circuit or batteries.

Adjusting Arms on Motor

The arm on front side of motor should control the front draft and rear arm should be connected to check damper.

If indicator hand on the Pressurestat is touching the low contact, the front arm should point down, and the arm on the back side point up.

Fastening Damper Chains and Pulleys

In connecting the chains to the draft damper and Balanced Check Damper, the arrangement shown in Figure No. 9 should be followed as closely as possible. Draft door should open ¼ in. to ¾ in. depending upon the intensity of the draft. Check Damper should open full wide.

If two boilers are installed, see Figure No. 10.

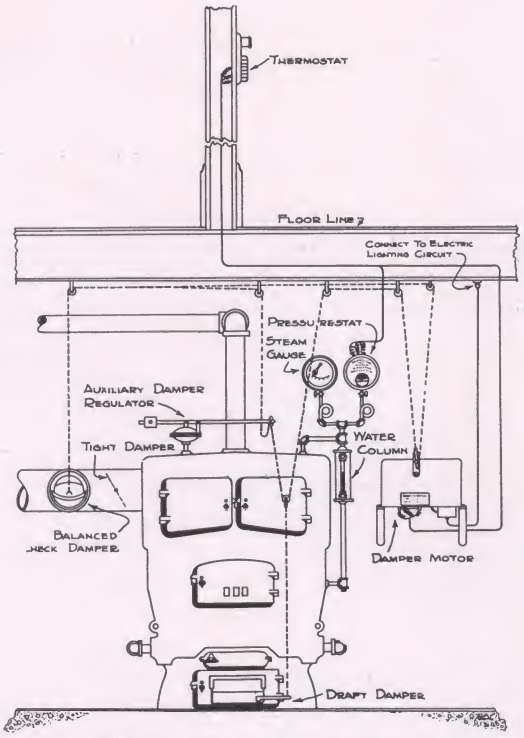


Figure No. 9—Method of Installing Damper Chains (One Boiler)

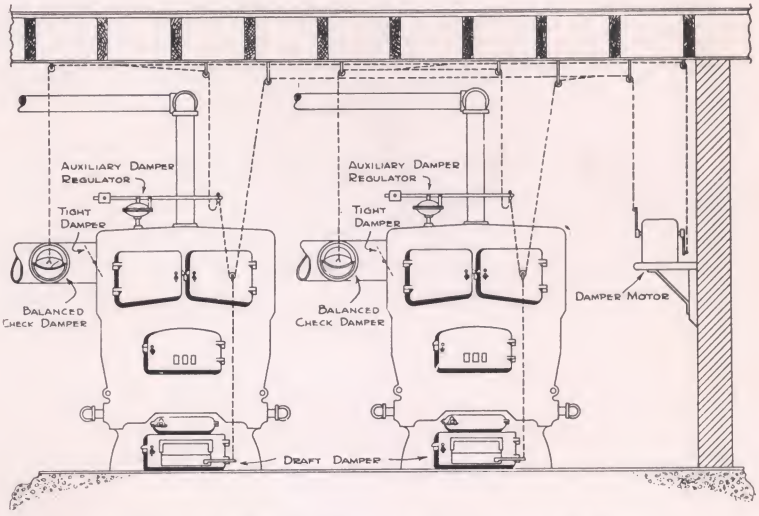


Figure No. 10—Method of Installing Damper Chains (Two Boilers)

Installing Thermostat

If Thermostat is used, it should be installed about five (5) feet from the floor on an inside wall, preferably in a room which is near end of steam main. Thermostat should not be placed behind a door or near a radiator or hot pipe.

A "Special Cable" is furnished where Thermostat has been purchased. All ends of this "special cable" are tagged showing where they should be connected. The cable running to Thermostat can either be concealed or run up on wall in room, as owner desires. Be sure to tape connections to back plate on Thermostat to prevent short circuiting after Thermostat has been screwed to wall.

Much time and work can be saved by dropping a small rope or wire down from point of outlet of Thermostat to basement below, before the walls are plastered. This provides an easy means of pulling the cable for the thermostat up from below at the time of installation.

When a Thermostat is installed, the arms on Motor should be adjusted from the Thermostat rather than from the Pressurestat. To do this, turn the indicator on Thermostat to point considerably higher than temperature shown on the thermometer on Thermostat. The arm on front of Motor should then be pointing down, and arm on back pointing up.